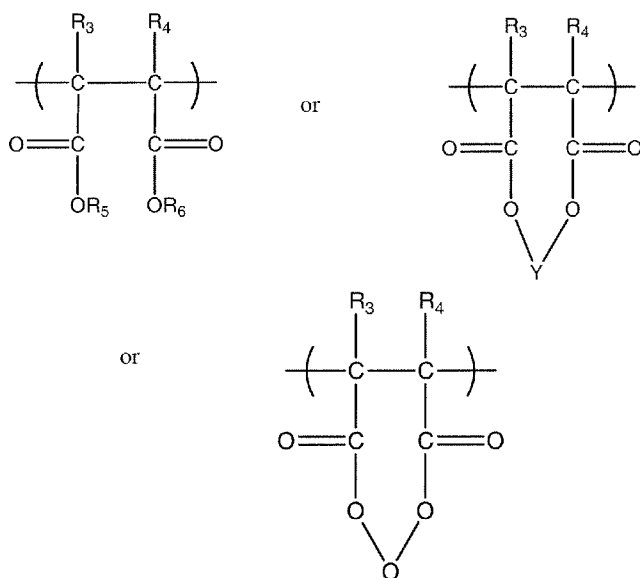
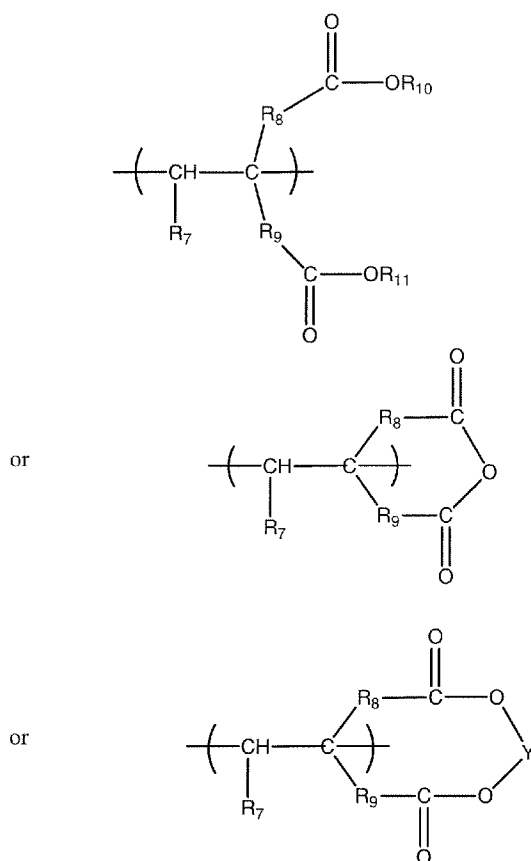


Claims

- [c1] 1.A fertilizer product comprising particles of a fertilizer in intimate contact with a polymer, said fertilizer being selected from the group consisting of phosphate-based fertilizers, organic wastes, waste waters, fertilizers containing nitrogen, phosphorous, potassium calcium, magnesium, sulfur, boron, or molybdenum materials, fertilizers containing micronutrients, and oxides, sulfates, chlorides, and chelates of such micronutrients, said polymer comprising recurring polymeric subunits each made up of at least two different moieties individually and respectively taken from the group consisting of B, and C moieties, or recurring C moieties, where moiety B is of the general formula



and moiety C is of the general formula



wherein each R_7 is individually and respectively selected from the group consisting of H, OH, $\text{C}_1\text{--C}_{30}$ straight, branched chain and cyclic alkyl or aryl groups, $\text{C}_1\text{--C}_{30}$ straight, branched chain and cyclic alkyl or aryl formate based ester groups, $\text{R}'\text{CO}_2$ groups, OR' groups and COOX groups, wherein R' is selected from the group consisting of $\text{C}_1\text{--C}_{30}$ straight, branched chain and cyclic alkyl or aryl groups and X is selected from the group consisting of H, the alkali metals, NH_4 and the $\text{C}_1\text{--C}_4$ alkyl ammonium groups, R_3 and R_4 are individually and respectively selected from the group consisting of H, $\text{C}_1\text{--C}_{30}$ straight, branched chain and cyclic alkyl or aryl groups, R_5 , R_6 , R_{10}

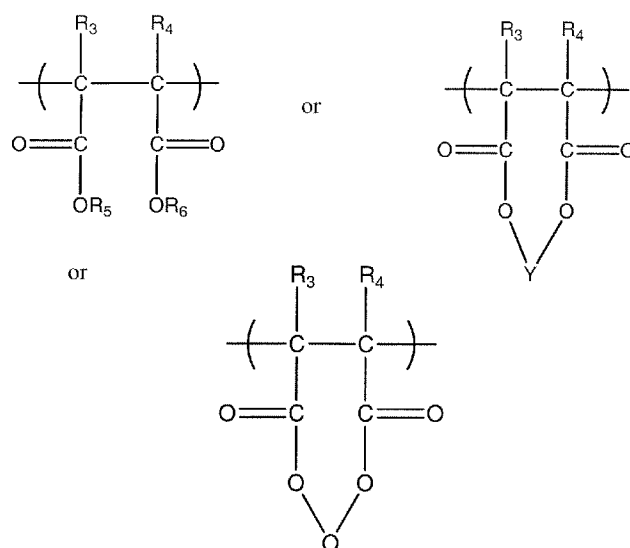
and R_{11} are individually and respectively selected from the group consisting of H, the alkali metals, NH_4 and the C_1-C_4 alkyl ammonium groups, Y is selected from the group consisting of Fe, Mn, Mg, Zn, Cu, Ni, Co, Mo, V and Ca, and R_8 and R_9 are individually and respectively selected from the group consisting of nothing (i.e., the groups are non-existent), CH_2 , C_2H_4 , and C_3H_6 , each of said moieties having or being modified to have a total of two COO groups therein.

- [c2] 2.The fertilizer product of claim 1, said polymer and fertilizer being co-ground together.
- [c3] 3.The fertilizer product of claim 1, said polymer being applied to the surface of said fertilizer.
- [c4] 4.The fertilizer product of claim 1, said fertilizer being in the form of particles having an average diameter of from about powder size to about 10 cm.
- [c5] 5.The fertilizer product of claim 1, said polymer being present in said fertilizer product at a level of from about 0.001 g to about 20 g polymer per 100 g fertilizer.
- [c6] 6.The fertilizer product of claim 1, said polymer being complexed with an ion.
- [c7] 7.The fertilizer product of claim 6, said ion being se-

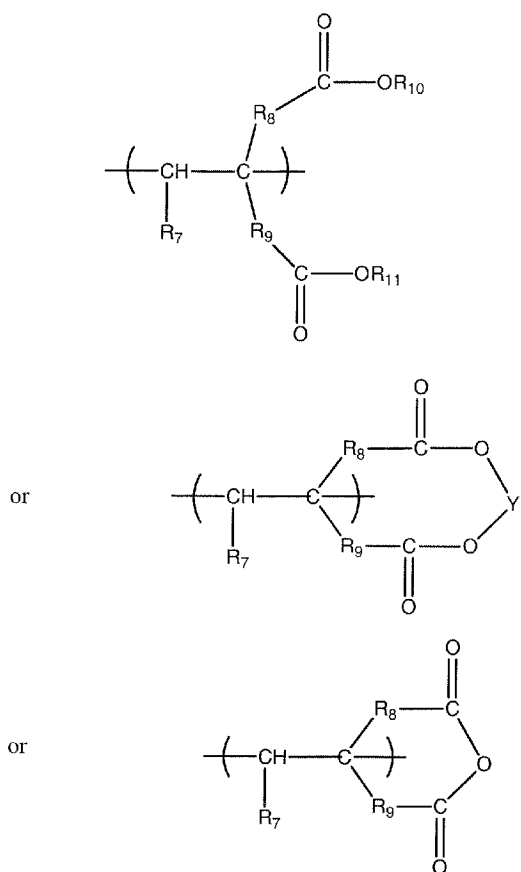
lected from the group consisting of Fe, Mn, Mg, Zn, Cu, Ni, Co, Mo, V and Ca.

- [c8] 8.The fertilizer product of claim 1, said polymer substantially coating the surface of said fertilizer.
- [c9] 9.The fertilizer product of claim 9, said product generating less dust than fertilizers without added polymer.
- [c10] 10.The fertilizer product of claim 9, said coating being applied at a level of at least about 0.01% by weight of the coated fertilizer product.
- [c11] 11.The fertilizer product of claim 9, said coating resulting in the complete inhibition of dust generation.
- [c12] 12.A method of enhancing the growth of plants comprising the step of applying to said plants or to the earth adjacent said plants a growth-enhancing amount of a fertilizer product comprising a fertilizer in intimate contact with a polymer, said fertilizer being selected from the group consisting of phosphate-based fertilizers, organic wastes, waste waters, fertilizers containing nitrogen, phosphorous, potassium calcium, magnesium, sulfur, boron, or molybdenum materials, fertilizers containing micronutrients, and oxides, sulfates, chlorides, and chelates of such micronutrients, said polymer comprising recurring polymeric subunits each made up of at

least two different moieties individually and respectively taken from the group consisting of B, and C moieties, or recurring C moieties, where moiety B is of the general formula



and moiety C is of the general formula



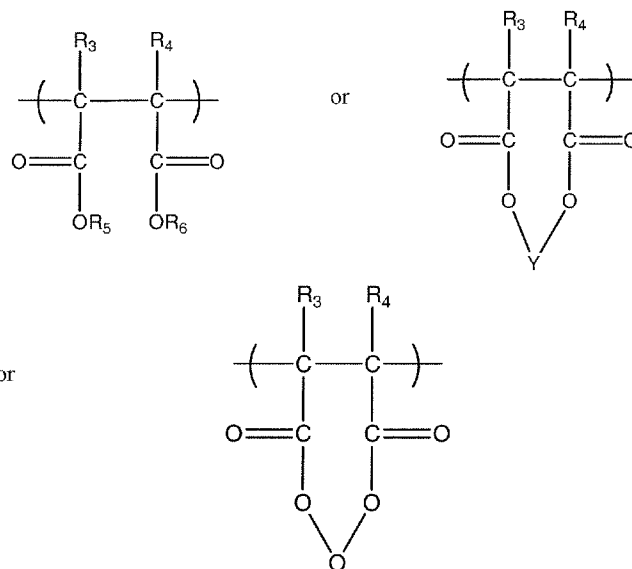
wherein each R_7 is individually and respectively selected from the group consisting of H, OH, C_1-C_{30} straight, branched chain and cyclic alkyl or aryl groups, C_1-C_{30} straight, branched chain and cyclic alkyl or aryl based ester groups, $R'CO_2$ groups, OR' groups and $COOX$ groups, wherein R' is selected from the group consisting of C_1-C_{30} straight, branched chain and cyclic alkyl or aryl groups and X is selected from the group consisting of H, the alkali metals, NH_4 and the C_1-C_4 alkyl ammonium groups, R_3 and R_4 are individually and respectively selected from the group consisting of H, C_1-C_{30} straight, branched chain and cyclic alkyl or aryl groups, R_5 , R_6 , R_{10} and R_{11} are individually and respectively selected from the group consisting of H, the alkali metals, NH_4 and the C_1-C_4 alkyl ammonium groups, Y is selected from the group consisting of Fe, Mn, Mg, Zn, Cu, Ni, Co, Mo, V and Ca, and R_8 and R_9 are individually and respectively selected from the group consisting of nothing (i.e., the groups are non-existent), CH_2 , C_2H_4 , and C_3H_6 , each of said moieties having or being modified to have a total of two COO groups therein.

- [c13] 13. The method of claim 12, said polymer being applied at a level of from about 0.001 lbs. to about 100 lbs. polymer per acre of said growing plants.

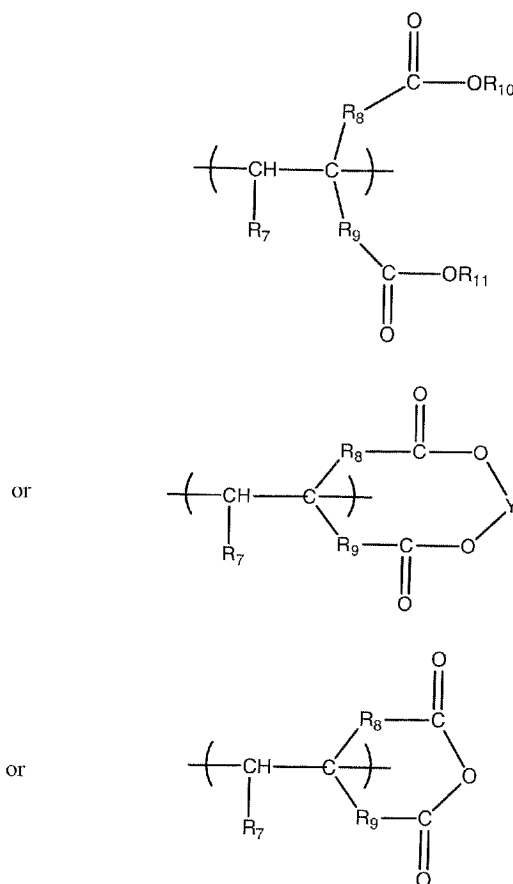
- [c14] 14.The method of claim 12, said fertilizer product being a liquid dispersion of said fertilizer and said polymer.
- [c15] 15.The method of claim 12, said fertilizer product being a granulated mixture of said fertilizer and said polymer.
- [c16] 16.The method of claim 12, said fertilizer product being a fertilizer having a polymer coating.
- [c17] 17.The method of claim 12, said fertilizer being in the form of particles having an average diameter of from about powder size to about 10 cm.
- [c18] 18.The method of claim 12, said polymer being present in said fertilizer product at a level of from about 0.001 g to about 20 g polymer per 100 g fertilizer.
- [c19] 19.The method of claim 12, including the step of applying said fertilizer product to the foliage of said plants.
- [c20] 20.The method of claim 12, including the step of applying said fertilizer product to the earth adjacent said plants.
- [c21] 21.The method of claim 12, said polymer being complexed with an ion.
- [c22] 22.The method of claim 21, said ion being a metal ion selected from the group consisting of Fe, Mn, Mg, Zn,

Cu, Ni, Co, Mo, V and Ca.

[c23] 23.A fertilizer product comprising particles of a fertilizer selected from the group consisting of phosphate-based fertilizers, organic wastes, waste waters, fertilizers containing nitrogen, phosphorous, potassium calcium, magnesium, sulfur, boron, or molybdenum materials, fertilizers containing micronutrients, and oxides, sulfates, chlorides, and chelates of such micronutrients, said fertilizer being in intimate contact with a composition comprising a dicarboxylic acid polymer having recurring polymeric subunits each made up of at least two different moieties individually and respectively taken from the group consisting of B and C moieties, or recurring C moieties, wherein moiety B is of the general formula



and moiety C is of the general formula



wherein each R₇ is individually and respectively selected from the group consisting of H, OH, C₁-C₃₀ straight, branched chain and cyclic alkyl or aryl groups, C₁-C₃₀ straight, branched chain and cyclic alkyl or aryl based ester groups, R'CO₂ groups, OR' groups and COOX groups, wherein R' is selected from the group consisting of C₁-C₃₀ straight, branched chain and cyclic alkyl or aryl groups and X is selected from the group consisting of H, the alkali metals, NH₄ and the C₁-C₄ alkyl ammonium groups, R₃ and R₄ are individually and respectively selected from the group consisting of H, C₁-C₃₀ straight, branched chain and cyclic alkyl or aryl groups, R₅, R₆, R₁₀ and R₁₁ are individually and respectively selected from

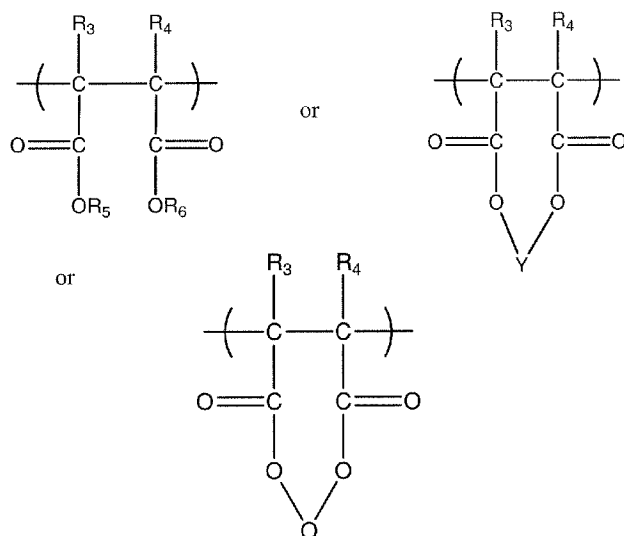
the group consisting of H, the alkali metals, NH_4 and the $\text{C}_1\text{--C}_4$ alkyl ammonium groups, Y is selected from the group consisting of Fe, Mn, Mg, Zn, Cu, Ni, Co, Mo, V and Ca, and R_8 and R_9 are individually and respectively selected from the group consisting of nothing (i.e., the groups are non-existent), CH_2 , C_2H_4 , and C_3H_6 , each of said moieties having or being modified to have a total of two COO groups therein.

- [c24] 24.The fertilizer product of claim 23, said polymer and said fertilizer being co-ground together.
- [c25] 25.The fertilizer product of claim 23, said polymer being applied to the surface of said fertilizer.
- [c26] 26.The fertilizer product of claim 23, said fertilizer being in the form of particles having an average diameter of from about powder size to about 10 cm.
- [c27] 27.The fertilizer product of claim 23, said polymer being present in said fertilizer product at a level of from about 0.001 g to about 20 g of polymer per 100 g fertilizer.
- [c28] 28.The fertilizer product of claim 23, said polymer being complexed with an ion.
- [c29] 29.The fertilizer product of claim 28 said ion being selected from the group consisting of Fe, Mn, Mg, Zn, Cu,

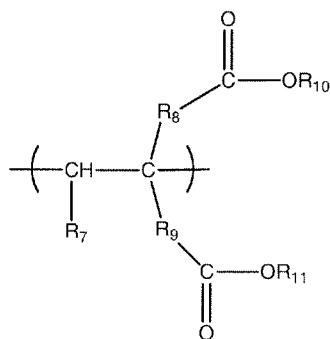
Ni, Co, Mo, V and Ca.

- [c30] 30.The fertilizer product of claim 25, said polymer substantially coating the surface of said fertilizer.
- [c31] 31.The fertilizer product of claim 25, said product generating a decreased amount of dust in comparison to fertilizers which do not have polymer on their surface.
- [c32] 32.The fertilizer product of claim 30, said coating level being at least about 0.005% by weight of the coated fertilizer product.
- [c33] 33.The fertilizer product of claim 30, said product generating little or no dust.
- [c34] 34.The fertilizer product of claim 33, said product generating no dust after abrasion resistance testing in accordance with Example 20.
- [c35] 35.A method of decreasing fertilizer dust comprising the step of coating fertilizer with a polymer, said fertilizer being selected from the group consisting of phosphate-based fertilizers, organic wastes, waste waters, fertilizers containing nitrogen, phosphorous, potassium calcium, magnesium, sulfur, boron, or molybdenum materials, fertilizers containing micronutrients, and oxides, sulfates, chlorides, and chelates of such micronutrients,

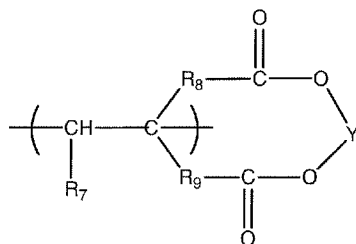
said polymer comprising recurring polymeric subunits each made up of at least two different moieties individually and respectively taken from the group consisting of B, and C moieties, or recurring C moieties, where moiety B is of the general formula



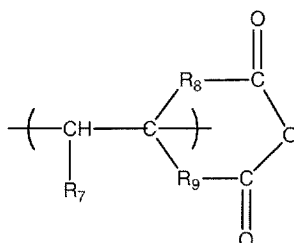
and moiety C is of the general formula



or



or



wherein each R_7 is individually and respectively selected from the group consisting of H, OH, C_1-C_{30} straight, branched chain and cyclic alkyl or aryl groups, C_1-C_{30} straight, branched chain and cyclic alkyl or aryl based ester groups, $R'CO_2$ groups, OR' groups and $COOX$ groups, wherein R' is selected from the group consisting of C_1-C_{30} straight, branched chain and cyclic alkyl or aryl groups and X is selected from the group consisting of H, the alkali metals, NH_4 and the C_1-C_4 alkyl ammonium groups, R_3 and R_4 are individually and respectively selected from the group consisting of H, C_1-C_{30} straight, branched chain and cyclic alkyl or aryl groups, R_5 , R_6 , R_{10} and R_{11} are individually and respectively selected from

the group consisting of H, the alkali metals, NH_4 and the C_1 – C_4 alkyl ammonium groups, Y is selected from the group consisting of Fe, Mn, Mg, Zn, Cu, Ni, Co, Mo, V and Ca, and R_8 and R_9 are individually and respectively selected from the group consisting of nothing (i.e., the groups are non-existent), CH_2 , C_2H_4 , and C_3H_6 , each of said moieties having or being modified to have a total of two COO groups therein.

[c36] 36. The method of claim 35, said polymer coating being at a level of at least about 0.005% w/w.